ECOTOXICITY DATA PROVIDED IN MSDS 6-May-10

Dispersant	Species	Common Name	Test Type	Result (mg/L)	Test on Actual Product?	Tox Data Found in EPA AQUIRE?	Active Ingredient
BioDispers	*Menidia beryllina*	Inland silverside fish	96hr LC50	13.46	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	78.9	yes		
Corexit 9500	*Acartia tonsa*	marine copepod	48hr LC50	34	yes	no	propylene glycol; sulfonic acid salt
	Artemia	shrimp	48hr LC50	20.7	yes		
	Menidia beryllina	Inland silverside fish	96hr LC50	25.2	yes		
	Mysidopsis bahia	shrimp	48hr LC50	32.23	yes		
Corexit 9527A	*Turbot*	fish	96hr LC50	50	no	yes	glycol ether, 2-butoxyethanol, sulfonic acid salt
	Menidia beryllina	Inland silverside fish	96hr LC50	14.57	yes		
	Mysidopsis bahia	shrimp	48hr LC50	24.14	yes		
Dispersit SPC 1000	*Mysidopsis bahia*	shrimp	48hr LC50	16.6	yes	no	
	Menidia berylilina	Inland silverside fish	96hr LC50	3.5	yes		
Finasol OSR 52	*Menidia beryllina*	Inland silverside fish	96hr LC50	11.66	yes	no	Hydrotreated light petroleum distillates; Kerosene biodegradable 68% in 28 d
	Mysidopsis bahia	shrimp	48hr LC50	9.37	yes		
JD-109	*Menidia beryllina*	Inland silverside fish	96hr LC50	1.9	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	1.18	yes		
JD-2000	*Menidia beryllina*	Inland silverside fish	96hr LC50	407	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	90.5	yes		
Mare Clean 200	*Menidia beryllina*	Inland silverside fish	96hr LC50	1996	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	938	yes		
Neos AB 3000	*Menidia beryllina*	Inland silverside fish	96hr LC50	91.1	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	33	yes		
Nokomis 3-AA	*Menidia beryllina*	Inland silverside fish	96hr LC50	34.22	yes	yes for Nokomis 3	
	Mysidopsis bahia	shrimp	48hr LC50	20.16	yes		
Nolomis 3F4	*Menidia beryllina*	Inland silverside fish	96hr LC50	29.8	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	32.2	yes		
Saf-Ron gold	*Menidia beryllina*	Inland silverside fish	96hr LC50	29.43	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	63	yes		
Sea Brat #4	*Menidia beryllina*	Inland silverside fish	96hr LC50	30	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	14	yes		
ZI-400 Oil	*Menidia beryllina*	Inland silverside fish	96hr LC50	31.76	yes	no	
	Mysidopsis bahia	shrimp	48hr LC50	20.96	yes		

Other Data Found from Google Search

Dispersant	Species	Common Name	Test Type	Result (mg/L)	Test on Actual Product?	Tox Data Found in EPA AQUIRE?	Comment
Corexit 9500	*Haliotis rufescens*	red abalone fish	48hr EC50	12.8-19.7	yes	no	
	Holmesimysis costata	mysid shrimp	96hr EC50	158-245	yes	no	
Corexit 9527A	*Acropora millepora*	coral			yes	no	Paper concludes "although crude oil and dispersant in-hibited larval metamorphosis individually, this toxicity was magnifed when larvae were exposed to combinations of both"

Tox Data Found for Ingredients in EPA AQUIRE?
no
yes

Source
Singer et al 1996
Negri and Heyward 2000

Summary of EPA's Plume Monitoring and Assessment Plan for Subsea Dispersant Application

Note: This monitoring and assessment plan for full-scale subsea application of dispersants will not be implemented until initial testing demonstrates the effectiveness of subsea dispersant application.

Purpose: The purpose of this plan is to monitor the movement and properties of a dispersed oil plume and to determine any ecological effects associated with the plume.

The Plan is broken down into two phases:

Phase I: Starts when the subsea application of dispersants is initiated, and focuses on:

a) confirming the location and extent of the subsurface plume,
b) determining how much oil remains in the dispersed plume and,
c) collecting oceanographic data to validate the models of plume movement

Phase II: Data collected during Phase II will be used to determine whether the dispersed plume is toxic to aquatic life. Phase II consists of:

a) water sampling to determine the presence and amount of dispersed oil,
b) oceanographic data to characterize the physical properties of the water column such as dissolved oxygen and oceanographic currents and,
c) chemical and biological monitoring within and outside the dispersed plume which will examine parameters such as dissolved oxygen concentrations and the toxicity of the plume to aquatic life using toxicity testing.

Criteria to Shutdown Dispersant Application:

This plan also defines the evaluation criteria for determining whether application of subsea dispersants should be shut down. These criteria include:

1) a significant reduction of dissolved oxygen,
2) the results of numerous toxicity tests and,
3) the evaluation of the conditions above in addition to other factors including shoreline, surface water, and other human health and ecological impacts.

Quality Assurance and Sampling Plan Requirements:

This monitoring and assessment plan requires that data collection management and analysis follows accepted standards to ensure that data is of the highest quality. Additionally, the plan outlines the criteria that must be included in all sampling and monitoring plans to ensure consistency and accuracy in the sampling process.

Additional Reporting Requirements:

This monitoring and assessment plan includes additional requirements that BP must follow including but not limited to the notification of testing or application; a description of methods and equipment used to inject the dispersant, and plume modeling to ensure that samples are taken from the correct location. All data will be given to the US Coast Guard and EPA within 24 hours of the information being received.

density (or specific gravity) along the thermal gradient of the water column, and kinematic viscosity are needed.

Phase 2. Daily Collection of the Following Parameters Until Further Notification[1]

A. Water column sampling collection

EPA will need a more thorough oil analysis to determine whether the dispersed plume is toxic to aquatic life. EPA will also need to know whether the dispersed oil will hang in the water column and eventually come in contact with the benthos as it approaches land. (Phase 1 may tell us this.)

Water samples will be taken to test for the presence of dispersed oil and droplet size and should be used to supplement the fluorometer data above, if needed. Droplet size will be determined using high resolution microphotography – pending depth rating.

Water samples at depth will be taken with a rosette sampler that can collect large enough samples for chemical analysis. Samples should be collected by rosette samplers at various depths inside and outside the plume and measured by a scanning spectrofluorometer using an excitation wavelength of 280 nm and emission wavelengths of 340 and 445 nm. For use on an oceanographic vessel, having two spetrofluorometers each operating at one specific emission wavelength obviates the need for quiescent conditions required for a scanning spectrofluorometer. Frequency of transects will be determined upon validation of the dispersed plume model. These measurements should be made daily for the duration. EPA also needs to see a desired range of numbers, in order to note if the dispersion process requires modification.

B. Other measurements within the plume:

1. Concentration of oil via extraction of water samples followed by UV-visible spectrophotometry (wavelengths of 340, 370, and 400 nm),
2. Total PAH via GC/MS (the latter analysis need only be done on a daily basis and later on a weekly basis using method EPA 8270D Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). Test Methods for Evaluating Solid Waste, Physical/Chemical Methods; Publication SW-846, 3rd Edition; U. S. Environmental Protection Agency: Washington, DC, 2007, http://www.epa.gov/waste/hazard/testmethods/sw846/pdfs/8270d.pdf.
3. Verification of DO depletion in the plume by Winkler titration of water samples and measurement of inorganic carbon (IC) in the plume (water samples). The importance of the latter two measurements is the fact that the dispersed oil will exert an oxygen demand in the water column, and this will show up in the DO and IC profile.

[1] See Appendix A for further background

first be performed since the collection of the sample will be directly from the toxic plume, and any sample from the plume will likely kill 100% of the test population. Therefore, the rangefinder must first be conducted to determine an order of magnitude dilution that gives a measurable response. Then, a more refined dilution procedure must be done to get the final LC50 answer. This result is then compared to a NOAA plume model that would predict when or where exertion of that toxic response would take place. EPA will interpret the results of both toxicity tests to enable determination of a shutdown decision.

The RRT will evaluate the conditions above, in addition, to all relevant factors including shoreline, surface water, and other human health and ecological impacts, to determine whether sub-surface dispersant application should be shut down.

IV. Limitations to Address

1. Timely transport of samples to labs, which must be done via boat, may be subject to weather and/or operational delays.
2. Sampling in the deep sea environment may pose challenges due to equipment limitations and malfunction.

V. Quality Assurance and Sampling Plan Requirements

Sample collection methodology, handling, chain of custody and decontamination procedures will follow accepted standards to ensure the highest quality data will be collected. Discrete samples will be tested at an approved lab(s). Samples are tested in a statistically significant manner. All samples (or as practicably possible) should be archived for potential future analysis. Where technically possible, all samples should be at least 100 ml. If these results are to be used as the basis for a longer-term monitoring plan, then more information on sampling frequency would be necessary. This would require further evaluation.

Sampling/Monitoring Plans must include the following key criteria:

1. An Introduction, to include project objective and project staff
2. A brief site description and background
3. A description of the Sampling Approach and Procedures, to encompass:
    a. A brief overview of sampling activities, data quality objective and health and safety implementation strategies (frequently, this references another specific document, but must be included).
    b. The actual sampling and/or monitoring approach, to ensure repeatability and consistent procedures. Describe sampling, monitoring, sampling and field QC procedures, spoil or waste disposal procedures resulting from this effort, as well as specimen/data handling issues.
    c. Sample management – how the sample will be procured, handled, and delivered

spectral changes associated with the application of dispersant can also be calibrated to quantify increasing oil or oil plus dispersant. The fact that UVFS and UVA data are comparable at an emission intensity of 445 nm or over the whole spectrum of intensities (from 300 - 500 nm) indicates that the fate of higher molecular weight (> 3-ring) PAH fractions - the more "dispersible" fraction of an oil slick - will provide a good idea of the fate of the oil as a whole during the dispersion process. Given that higher molecular weight PAHs may be associated with many of the persistent (or chronic) toxic effects of crude oils on marine organisms, the ability of UVFS to track "dispersible" fractions would make it a particularly useful tool in studies of the long-term toxic effects of dispersed oil.

ACUTE TOXICITY OF DISPERSANTS AND COMPONENTS[1] AS COMPARED TO CHLORINE [2]
NOTE: HIGHER LC50 VALUES EQUATES TO LESS TOXICITY

Test Organism [3]	Genus species	LC50 (ppm) EC9500A	LC50 (ppm) EC9527A	LC50 (ppm) 2-Butoxyethanol	LC50 (ppm) Propylene Glycol	LC50 (ppm) EC9500A	LC50 (ppm) [4] Chlorine
Inland Silverside	*Menidia beryllina*	25	15	1,250	---	87	0.037 [5]
Mysid Shrimp	*Mysidopsis bahia* [6]	32	24	---	---	---	0.162
Brine Shrimp	*Artemia salina*	21	130	1,000	>10,000	32	---
Calanoid copepod	*Acartia tonsa*	34	--	---	---	---	

Notes:
(1) As listed by Nalco MSDS
(2) Data are 48 hour for invertebrate and 96 hour for fish.
(3) All organisms are saltwater
(4) Values are species mean acute values listed in the USEPA "Ambient Water Quality Criteria" Document for this constituent.
(5) Value is for the Atlantic Silverside, *Menidia menidia*.
(6) Re-named *Americamysis bahia*, some data for non-Nalco constituents were published as *A. bahia*.
--- = No data.
ppm = mg/L

Data from http://www.epa.gov/emergencies/content/ncp/product_schedule.htm and
USEPA ECOTOX (AQUIRE), Nalco MSDS, or NAS "Understanding Oil Spill Dispersants: Efficacy and Effects"

Chlorine is known as a fast-acting acute toxicant. Chlorine is not a component of the dispersants.